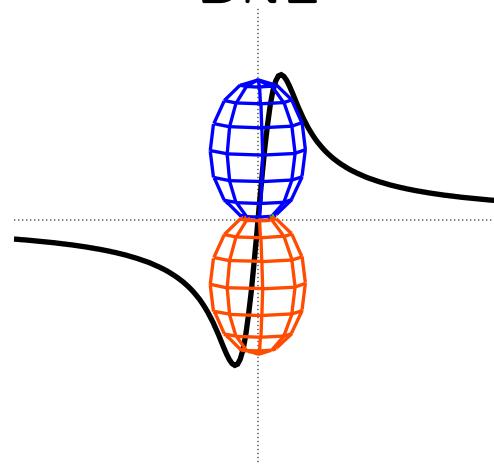


Phase scans for beam-beam

R. Tomás

BNL

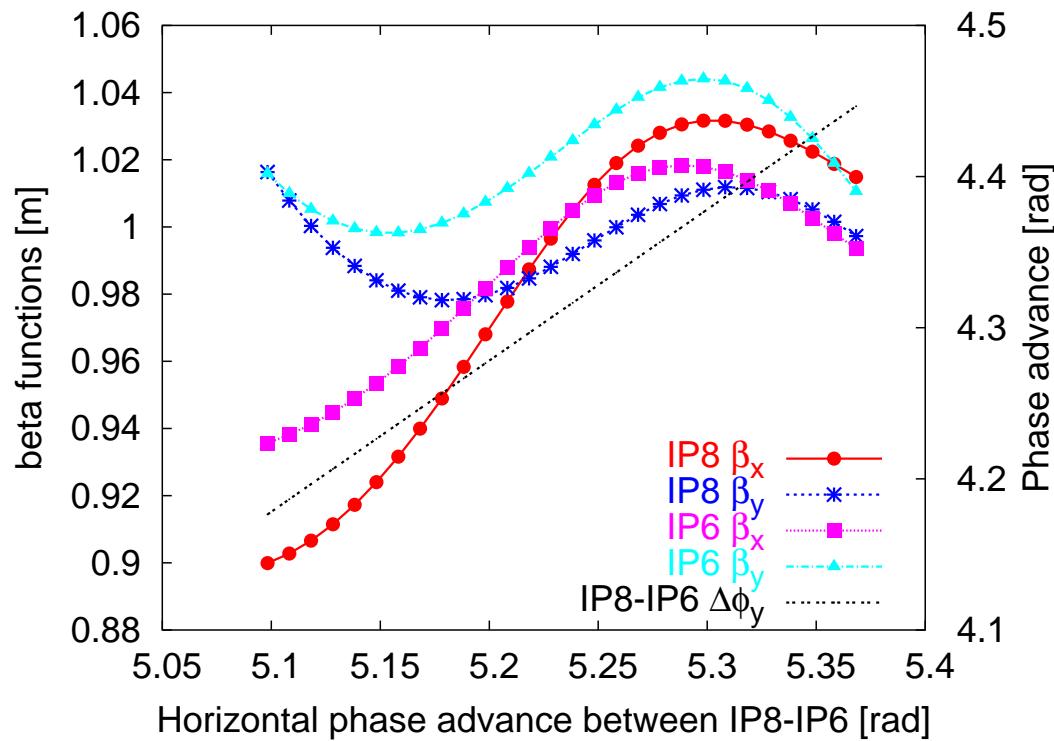


September 15, 2004

Optics of the phase scans I

1

RHIC operation working point (0.225, 0.235)

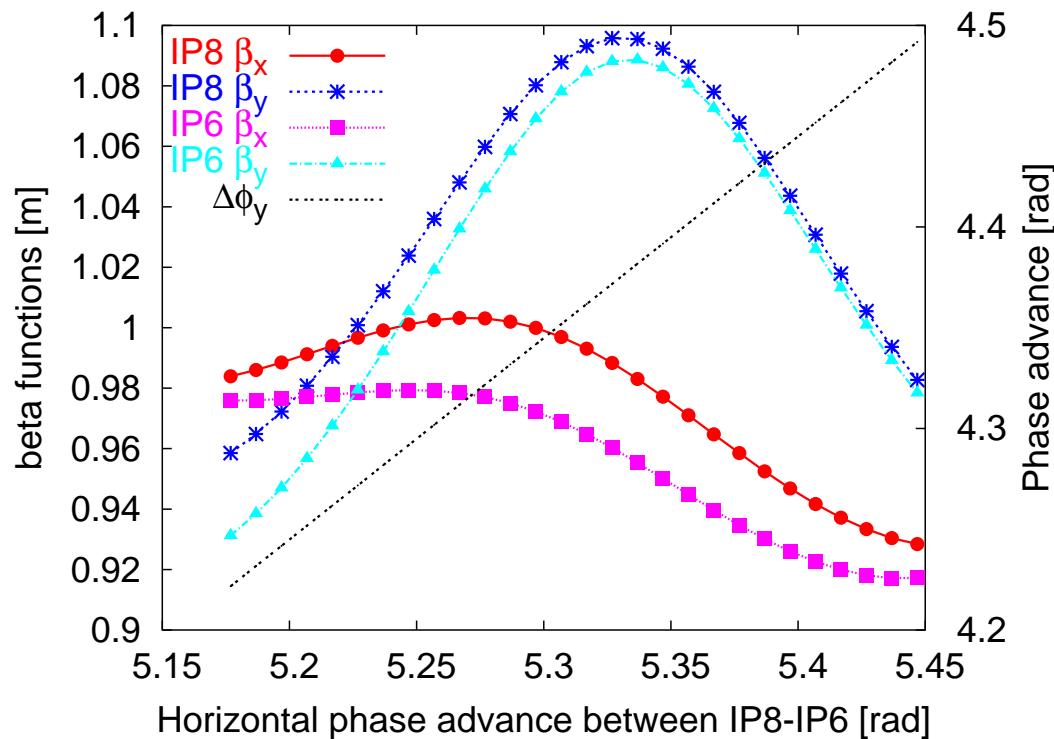


→ Beta functions are within good limits

Optics of the phase scans II

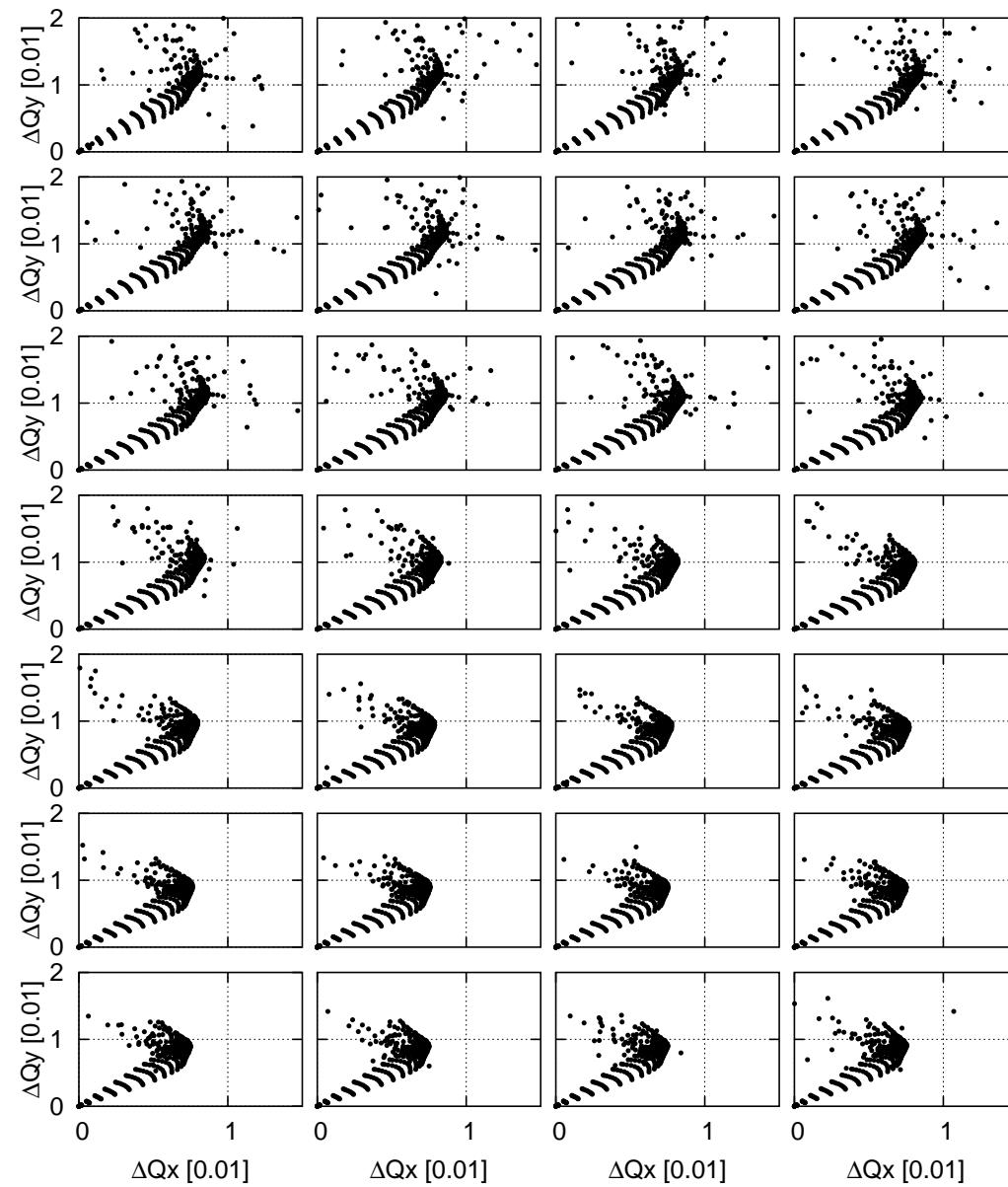
2

SPS working point (0.69, 0.685)



→ Optics are more sensitive for the SPS tunes

Beam-beam footprints for RHIC operation tunes 3



With two identical interaction points the resonance strength:

$$f_{(j,k)} \propto \frac{1 + e^{i2\pi(j\Delta\phi_x + k\Delta\phi_y)}}{1 - e^{i2\pi(jQ_x + kQ_y)}} \quad (1)$$

For given tunes:

- The strength is maximum if

$$j\Delta\phi_x + k\Delta\phi_y = N, \quad N \text{ integer} \quad (2)$$

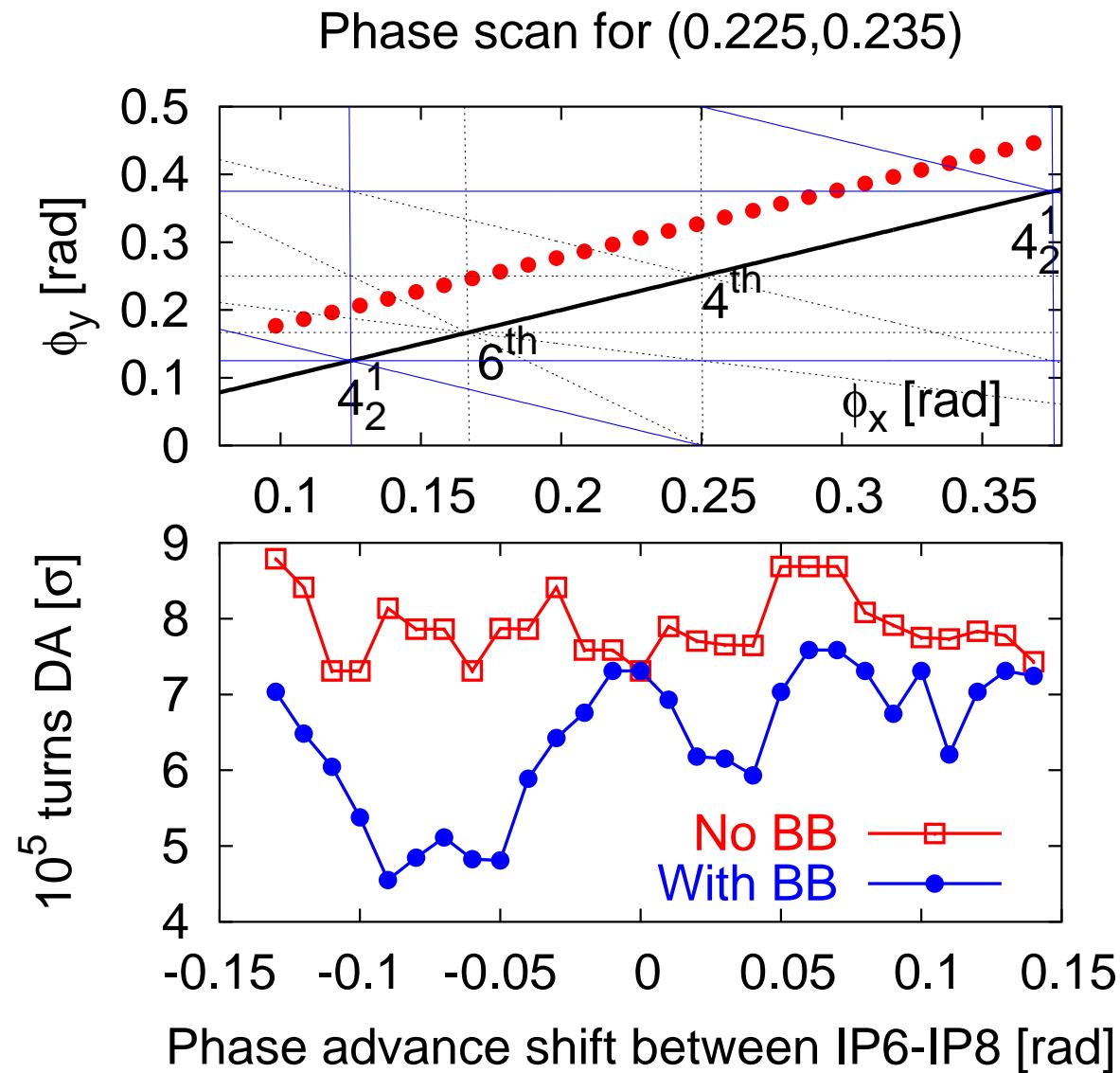
- The strength is zero if

$$j\Delta\phi_x + k\Delta\phi_y = N/2, \quad N \text{ integer} \quad (3)$$

→ Similar diagrams to those of the working point

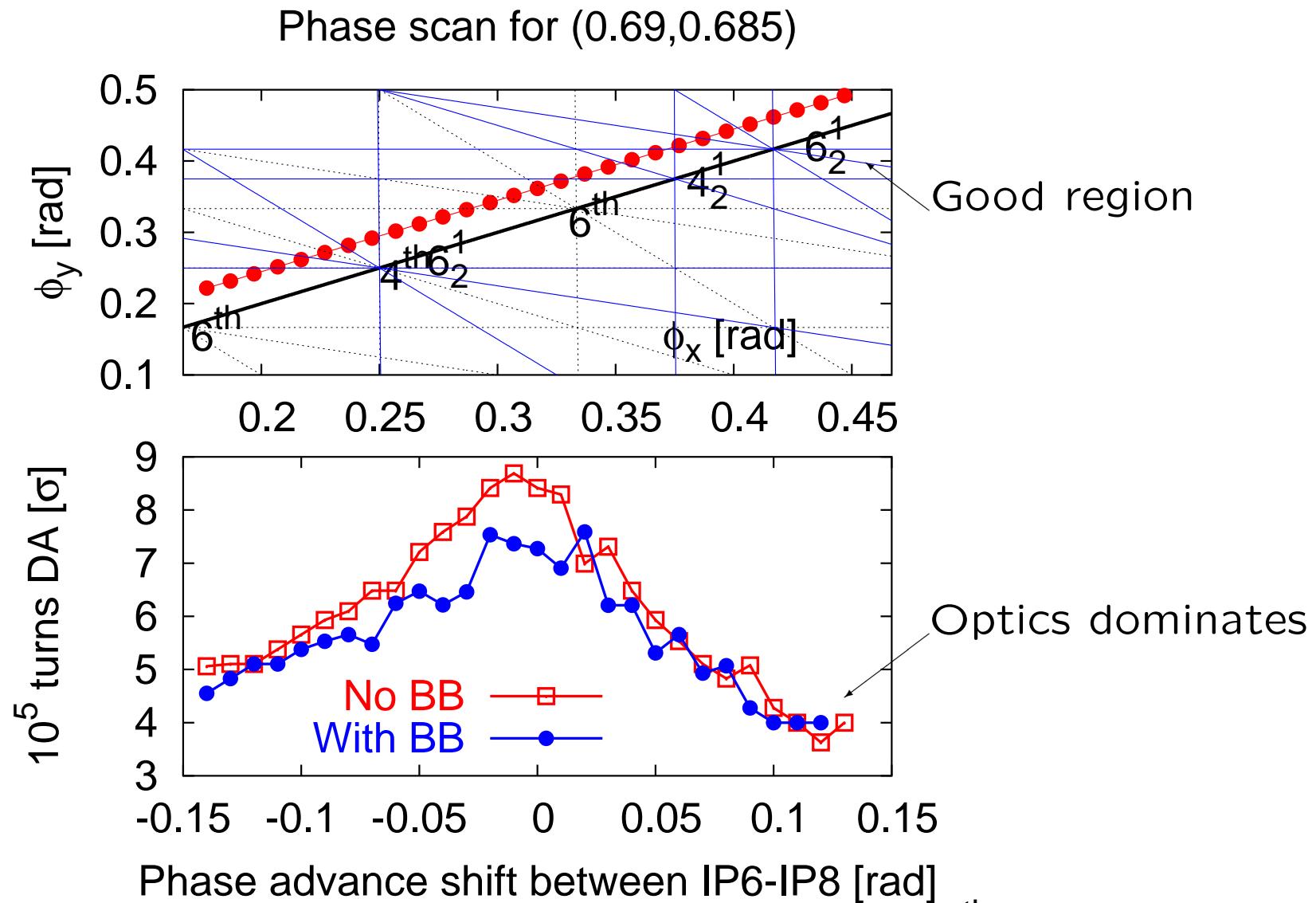
DA for RHIC operation tunes

5



DA for SPS tunes

6



Outlook for simulations

7

- Find realistic ways of changing $\phi_{x,y}$
(the presented arc scheme is not feasible)
- Scan $\phi_{x,y}$ in the full box
- Compute 10^6 turn DA for selected cases
- 4 interaction points?

Principle:

Measure the beam decay while scanning the phase advances with constant tunes (injection easier than store)

Instrumentation:

- Tune feedback (available)
- Means to change $\phi_{x,y}$ (not available)
- Wall current monitor (available)

Conclusions

9

- Phase advances play an important role on beam stability
- Ways to change phase advances without disturbing the optics need to be found
- Fruitful beam experiment when the technique is ready